WE CLAIM:

1. A process for the regeneration of a hydrocarbon conversion catalyst in the presence of a halogen-containing material, the process comprising:

(a) contacting a regeneration inlet stream comprising a first component selected from the group consisting of oxygen, hydrogen, nitrogen, and a C_1-C_5 hydrocarbon with a catalyst in the presence of a halogen-containing material at regeneration conditions to at least partially regenerate said catalyst and produce a regeneration effluent stream comprising said material and said first component;

(b) contacting at least a portion of said regeneration effluent stream with an adsorbent, adsorbing said material on said adsorbent at adsorption conditions, and recovering an adsorption effluent stream comprising said first component and having a reduced concentration of said material relative to said at least a portion of said regeneration effluent stream;

(c) contacting a desorption inlet stream comprising a second component selected from the group consisting of oxygen, hydrogen, nitrogen, and a C_1-C_5 hydrocarbon with said adsorbent, said adsorbent having said material adsorbed thereon, desorbing said material from said adsorbent at desorption conditions, and recovering a desorption effluent stream comprising said material and said second component; and

(d) forming said regeneration inlet stream from at least a portion of said desorption effluent stream.

2. The process of Claim 1 wherein said adsorbent is selected from the group consisting of a molecular sieve, silica gel, carbon, and alumina.

3. The process of Claim 1 wherein said catalyst is selected from the group consisting of a reforming catalyst, an isomerization catalyst, and a dehydrogenation catalyst.

4. The process of Claim 1 wherein said regeneration is selected from the group consisting of burning carbon deposits on said catalyst, oxidizing a metal on said catalyst, drying said catalyst, and reducing a metal on said catalyst.

5. The process of Claim 1 further characterized in that at least 80 percent of said material in said regeneration effluent stream is adsorbed on said adsorbent.

6. The process of Claim 1 further characterized in that at least about 90 percent of said material in said regeneration effluent stream is adsorbed on said adsorbent.

7. The process of Claim 1 further characterized in that said adsorption conditions comprise a temperature of less than about 482°C and a molar ratio of water to halogen of more than 5:1.

8. The process of Claim 1 further characterized in that said adsorbent has a capillary condensation temperature at said adsorption conditions, and said adsorption conditions comprise a temperature of greater than said capillary condensation temperature.

9. The process of Claim 1 wherein said halogen is chlorine or fluorine.

10. The process of Claim 1 wherein said material is selected from the group consisting of hydrogen chloride and molecular chlorine.

11. The process of Claim 1 further characterized in that said adsorbent has a pre-adsorption halogen content prior to said contacting and said adsorbing in (b), said adsorbent has a post-adsorption halogen content after said contacting and said desorbing in (c), and the difference between said pre-adsorption halogen content and said post-adsorption halogen content is from about 0.2 to about 2.0 wt-% halogen, based on the weight of the adsorbent.

12. The process of Claim 1 further characterized in that said regeneration inlet stream has a regeneration inlet temperature and a regeneration inlet molar ratio of water to halogen, said desorption effluent stream has a desorption effluent temperature and a desorption effluent molar ratio of water to halogen, the difference between said regeneration inlet temperature and said desorption effluent temperature is less than

about 20°C, and the difference between said regeneration inlet molar ratio and said desorption effluent molar ratio is less than about 5:1.

13. The process of Claim 1 further characterized in that the adsorption conditions comprise an adsorption temperature and an adsorption molar ratio of water to halogen, the desorption conditions comprise a desorption temperature and a desorption molar ratio of water to halogen, the difference between the desorption temperature and the adsorption temperature is more than about 55°C, and the ratio of the adsorption molar ratio to the desorption molar ratio is from about 0 to about 2.

14. The process of Claim 1 further characterized in that a component consisting of at least one of water and a compound that can react to form water is introduced into said process and said water contacts said adsorbent in (c).

15. The process of Claim 1 further characterized in that at least one of said at least a portion of the desorption effluent stream and the regeneration inlet stream is cooled.

16. A sorptive method for recovering a chlorine-containing material from the outlet stream of a cyclic regeneration operation of a hydrocarbon conversion process using a hydrocarbon conversion catalyst, said method comprising:

(a) passing hydrocarbons to a first catalyst bed containing a hydrocarbon conversion catalyst and converting said hydrocarbons;

(b) passing a regeneration inlet stream comprising a first component selected from the group consisting of oxygen, hydrogen, nitrogen, and a C_1-C_5 hydrocarbon to a second catalyst bed containing said hydrocarbon conversion catalyst, at least partially regenerating said hydrocarbon conversion catalyst in said second catalyst bed at regeneration conditions and in the presence of a chlorine-containing material, and recovering from the second catalyst bed a regeneration effluent stream comprising said material and said first component;

(c) passing at least a portion of said regeneration effluent stream to an adsorption zone containing an adsorbent, adsorbing said material on said adsorbent at adsorption conditions, and recovering an adsorption effluent

stream comprising said first component and having a reduced concentration of said material relative to said regeneration effluent stream;

(d) passing a desorption inlet stream comprising a second component selected from the group consisting of oxygen, hydrogen, nitrogen, and a C_1-C_5 hydrocarbon to a desorption zone containing said adsorbent, said adsorbent in said desorption zone having said material adsorbed thereon, desorbing said material from said adsorbent in said desorption zone, and recovering a desorption effluent stream comprising said material and said second component;

(e) forming said regeneration inlet stream from at least a portion of the desorption effluent stream; and

(f) at least periodically shifting the functions of said adsorption and desorption zones by operating said adsorption zone to function as said desorption zone in (d), and operating said desorption zone to function as said adsorption zone in (c);

17. The process of Claim 16 further characterized in that the functions of said first and second catalyst beds are at least periodically shifted by operating said first catalyst bed to function as said second catalyst bed in (b), and operating said second catalyst to function as said first catalyst bed in (a).

18. The process of Claim 16 further characterized in that said adsorption effluent stream comprises said material, at least a portion of said adsorption effluent stream is contacted with an aqueous solution to remove said material from said at least a portion of said adsorption effluent stream and to form a recycle stream comprising said first component, and said desorption inlet stream is formed from at least a portion of said recycle stream.

19. The process of Claim 18 wherein said first component is said second component.

20. The process of Claim 16 wherein said hydrocarbon conversion process is a process selected from the group consisting of reforming, isomerization, and dehydrogenation.

21. The process of Claim 16 wherein said regeneration is selected from the group consisting of burning carbon deposits on said catalyst, oxidizing a metal on said catalyst, drying said catalyst, and reducing a metal on said catalyst.

22. The process of Claim 16 further characterized in that at least about 80 percent of said material in said regeneration effluent stream is adsorbed on said adsorbent.